



**National  
Transportation  
Safety Board**

# Enhancing Aviation Safety: The NTSB Mission, Activities, and Resources

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Board Member

Georgia Institute of Technology  
November 12, 2014

# Federal Agencies: Transportation

NTSB

FMCSA

FRA

NHTSA

PHMSA

DOT

MARAD

FTA

FHWA

FAA



NTSB



- 1) determining the probable cause of transportation accidents**
- 2) making recommendations to prevent their recurrence**



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All Modes



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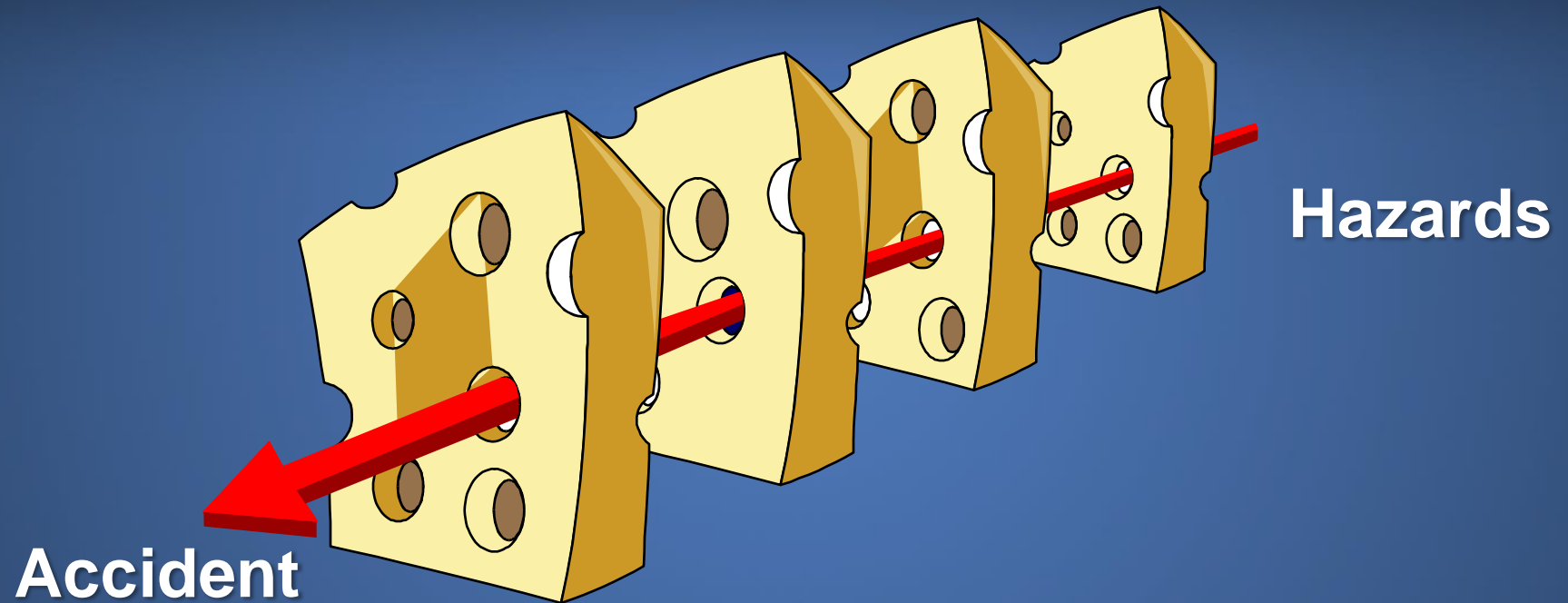


# Independent Federal Agency: Created in 1967

- >140,500 accident investigations
- 14,000+ safety recommendations
- ~ 2,300 organizations/recipients
- 82% acceptance rate



# “Swiss Cheese” Model (Reason)



Successive layers of defenses, barriers, and safeguards



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# NTSB Go Team: 24/7/365

- Individual investigator
- Regional/limited team
- Major launch/Board Member





# Key On-scene Events



## Organizational Meeting

- Designate parties and party coordinators
- Establish and organize groups

## Progress Meetings

- Summarize findings
- Info for briefings

## Family Briefings

## Press Briefings



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# NTSB Investigative Process



# On-scene Investigation

# Organizational Meeting Groups and Parties

Progress meetings  
Media Briefings  
Press Releases

[illegible]

# Preliminary Report

## Factual information



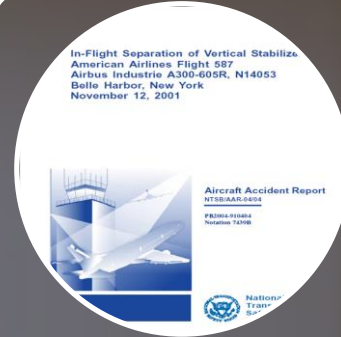
# Public Hearing

Fact finding  
Depositions  
Witnesses  
Docket



# Board Meeting

Docket  
Findings  
Conclusions  
Probable Cause  
Safety  
Recommendations



# Final Report

## Government in the Sunshine Act

Descent Below Visual Glidepath and Impact With Seawall  
Asiana Airlines Flight 214  
Boeing 777-200ER, HL7742  
San Francisco, California  
July 6, 2013



**Accident Report**

NTSB/AAR-14/01  
PB2014-105984



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# Final Accident Report

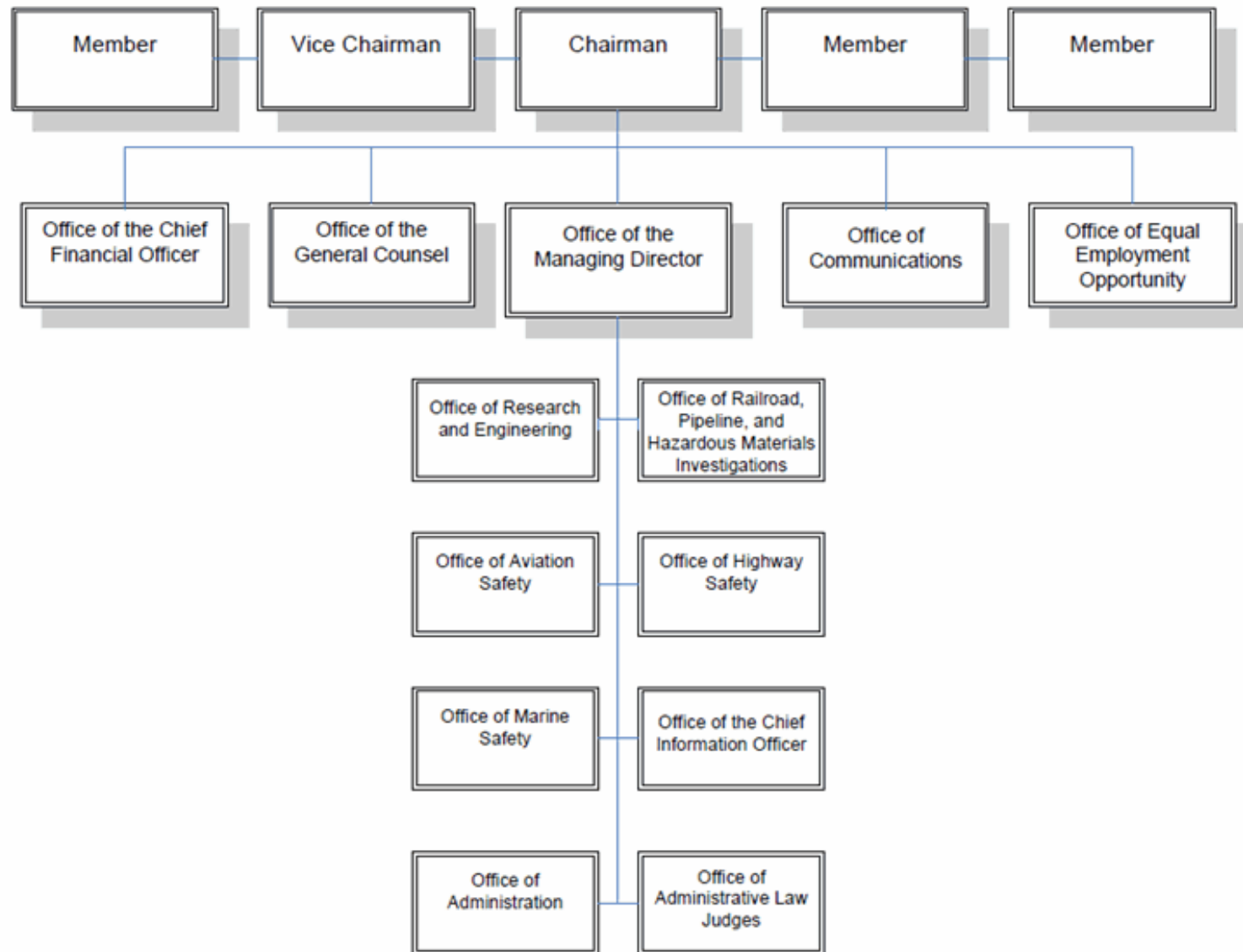
- Factual Information
- Analysis
- Conclusions
  - Findings
  - Probable Cause
- Recommendations



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# NATIONAL TRANSPORTATION SAFETY BOARD



# NTSB: The Board

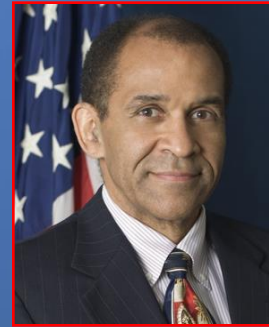
- Five Members:
  - President nominates
  - Senate confirms



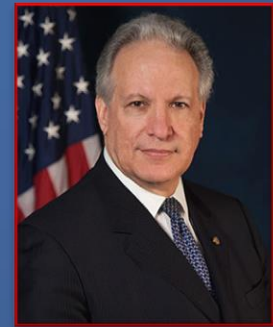
Earl Weener  
Member



Robert Sumwalt  
Member



Chris Hart  
Acting Chairman



Mark Rosekind  
Member



Honorable John K. Lauber:

No Accident  $\neq$   
Safe Operation

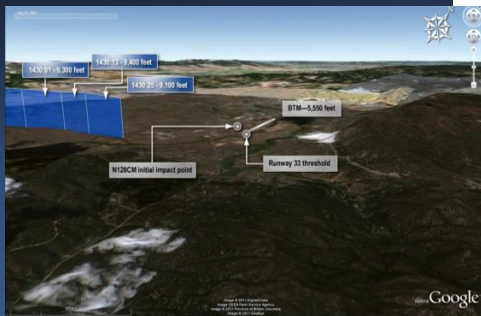


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# Accident Reports

Crash Following Loss of Engine Power Due to Fuel Exhaustion  
Air Methods Corporation  
Eurocopter AS350 B2, N352LN  
Near Mosby, Missouri  
August 26, 2011



Loss of Control While Maneuvering  
Pilatus PC-12/45, N128CM  
Butte, Montana  
March 22, 2009



Pilot/Race 177, *The Galloping Ghost*  
North American P-51D, N79111  
Reno, Nevada  
September 16, 2011



Accident Report  
NTSB/AAR-11/05  
PB2011-910405



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Accident Report

NTSB/AAR-13/02  
PB2013-104866



Figure 10. Inboard piece of left elevator trim tab separated.  
Photograph courtesy of Julia Kirchenbauer.

Omega Aerial Refueling Services flight  
Aircraft Accident Brief



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# Safety Recommendations



## National Transportation Safety Board Washington, DC 20594

### Safety Recommendation

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Date: February 28, 2013

In reply refer to: A-13-01 to -03

The Honorable Michael P. Huerta  
Administrator  
Federal Aviation Administration  
Washington, DC 20591

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## National Transportation Safety Board Washington, DC 20594

### Safety Recommendation

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Date: May 15, 2013

In reply refer to: A-13-21

46 US states, 4 territories and DC  
(See attached distribution list)

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## National Transportation Safety Board Washington, DC 20594

### Safety Recommendation

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Date: May 15, 2013

In reply refer to: A-13-20

The Honorable Sally Jewell  
Secretary  
Department of the Interior  
1849 C Street, NW  
Washington, DC 20240-0001

The Honorable Chuck Hagel  
Secretary  
Department of Defense  
The Pentagon  
Washington, DC 20301-1155

The Honorable Tom Vilsack  
Secretary  
Department of Agriculture  
1400 Independence Avenue, SW  
Washington, DC 20250-0002

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# Safety Alerts



## NTSB SAFETY ALERT

National Transportation Safety Board



### All Secure, All Clear



**Be vigilant regarding accountability and security of items**

#### The problem



## NTSB SAFETY ALERT

National Transportation Safety Board



### Pilots: Understand Impairment Risk



**Over-the-Counter and Prescription Drugs Can Cause Impairment**

#### The problem

- Toxicology tests of pilots involved in fatal aviation accidents increasingly show evidence that a wide variety of over-the-counter (OTC) and prescription drugs have been used, including drugs that are potentially impairing.
- Pilots may be using OTC or prescription drugs without realizing that they can cause impairment.
- Pilot impairment reduces the safety of flight and increases accident risk.
- Pilot impairment due to the effects of drugs is preventable.

#### Related accidents

- On May 5, 2012, a Cessna 177B impacted terrain after experiencing an aerodynamic stall about 300 feet above the ground during a go-around. The investigation found no preaccident anomalies with the aircraft. Postaccident toxicology testing of the fatally injured pilot showed that the pilot had taken diphenhydramine, an OTC sedating antihistamine commonly marketed under the names Benadryl and Unisom. The drug's effects and pilot impairment were contributing factors in the accident. [\[ERA12FA319\]](#)
- On March 30, 2011, a Cessna 310R impacted terrain while conducting a nonprecision approach to a mountain top airport that was obscured by clouds and fog. The investigation found no preaccident anomalies with the aircraft. Toxicological testing of the fatally injured pilot found significant amounts of doxylamine, a sedating antihistamine, in combination with other drugs that suggested use of an OTC cold medicine such as a Nyquil or an Aldex product. The drug's effects and pilot impairment were contributing factors in the accident. [\[ERA11FA218\]](#)
- On July 7, 2010, a Eurocopter AS-360-B2 helicopter flying during the day in good visibility impacted trees and terrain. The investigation found no preaccident anomalies with the aircraft. Toxicological testing of the fatally injured pilot showed



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### Distracting Devices? Turn Them Off!



**Avoid Nonoperational Use of Portable Electronic Devices (PEDs) Before and During Flight**

#### The problem

Nonoperational use of PEDs by pilots (including cell phones, smart phones, tablets, and laptop computers) can divert attention from activities necessary for safe operations, both in the air and on the ground.

Nonoperational use of PEDs has been documented during

- Preflight planning and preparation,
- cruise, and
- maneuvering flight.

PED-related distraction has played a role, or at least been present, in accidents involving improper fuel management, loss of positional awareness, loss of automation mode awareness, collision with obstacles, and loss of control.

#### Related accidents

On August 26, 2011, a Eurocopter AS350 B2 helicopter, N352LN, impacted terrain following an engine failure near the airport in Mosby, Missouri. The helicopter experienced fuel exhaustion because the pilot departed without ensuring that the helicopter was adequately fueled. The investigation determined that the pilot engaged in frequent personal texting, both before and during the accident flight. The pilot and a flight nurse, flight paramedic, and patient were killed. (CEN11FA599)<sup>1</sup>

<sup>1</sup> The report for this accident, which includes concurring and dissenting statements, is accessible at [www.ntsb.gov/doclib/reports/2013/AAR1302.pdf](http://www.ntsb.gov/doclib/reports/2013/AAR1302.pdf). The reports for the other accidents referenced in this safety alert are accessible by NTSB case number at [www.ntsb.gov/aviationquery/index.aspx](http://www.ntsb.gov/aviationquery/index.aspx). Each accident's public docket is accessible at [www.ntsb.gov/investigations/dms.html](http://www.ntsb.gov/investigations/dms.html).



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### Pilots: Manage Risks to Ensure Safety



**Good decision-making and risk management practices can help prevent accidents**

#### The problem

Although few pilots knowingly accept severe risks, accidents can also result when several risks of marginal severity are not identified or are ineffectively managed by the pilot and compound into a dangerous situation. Accidents also result when the pilot does not accurately perceive situations that involve high levels of risk.

Ineffective risk management or poor aeronautical decision-making can be associated with almost any type of fatal accident across all general aviation (GA) sectors.<sup>1</sup>

#### Related accident

Sadly, the current previous accident learned from such following accident scenarios.



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### Check Your Restraints



**Carefully follow restraint system maintenance and replacement guidance to prevent death and injuries**

#### The problem

- General aviation aircraft restraints degrade due to age, UV exposure, and repeated use.
- Although restraints are required to be inspected annually, degradation of their capability can be difficult for aircraft owners and maintenance personnel to detect.
- Some aircraft are only equipped with lap belts and do not have shoulder harnesses, which can prevent occupants from impacting the airplane interior during a crash.

#### Related accidents

The NTSB has investigated several accidents in which restraint systems did not perform to their design standards because they had degraded or in which shoulder harnesses were not installed on the aircraft. Occupants often sustain serious or fatal injuries during accidents when a restraint fails or is not used, and numerous studies by the NTSB and others have shown improved survivability and decreased injuries when shoulder harnesses are installed and used in aircraft. The following accident summaries illustrate some common—and preventable—accident scenarios related to these issues:

- A commercial pilot died when his Taylorcraft F-19 airplane impacted terrain after takeoff and his shoulder harness failed. The passenger's restraint system remained intact, and she sustained serious injuries. Examination of the pilot's shoulder harness revealed features consistent with a previous overload tensile failure, which reduced the capability of the shoulder harness to provide adequate occupant protection. (NTSB accident number [\[ANC05FA070\]](#))
- A commercial pilot of an aerial application flight sustained serious injuries following a wire strike in a Piper PA-36-285 airplane. Examination of the pilot's restraints showed signs of wear and degradation, and the lap belt failed inboard of the adjustment buckle. [\[CEN09LA023\]](#)
- A private pilot and his passenger died during a ditching following a loss of engine power in a Beech A36 airplane. The airplane was not equipped with shoulder harnesses. The cause of death for both occupants was attributed to drowning with complications due to blunt force trauma. The installation and use of shoulder harnesses would have significantly increased the occupants' chances of survival by reducing the severity of the



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# Forums and Symposia



September 10-11, 2013



[www.nts.gov](http://www.nts.gov)



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# NTSB Training Center

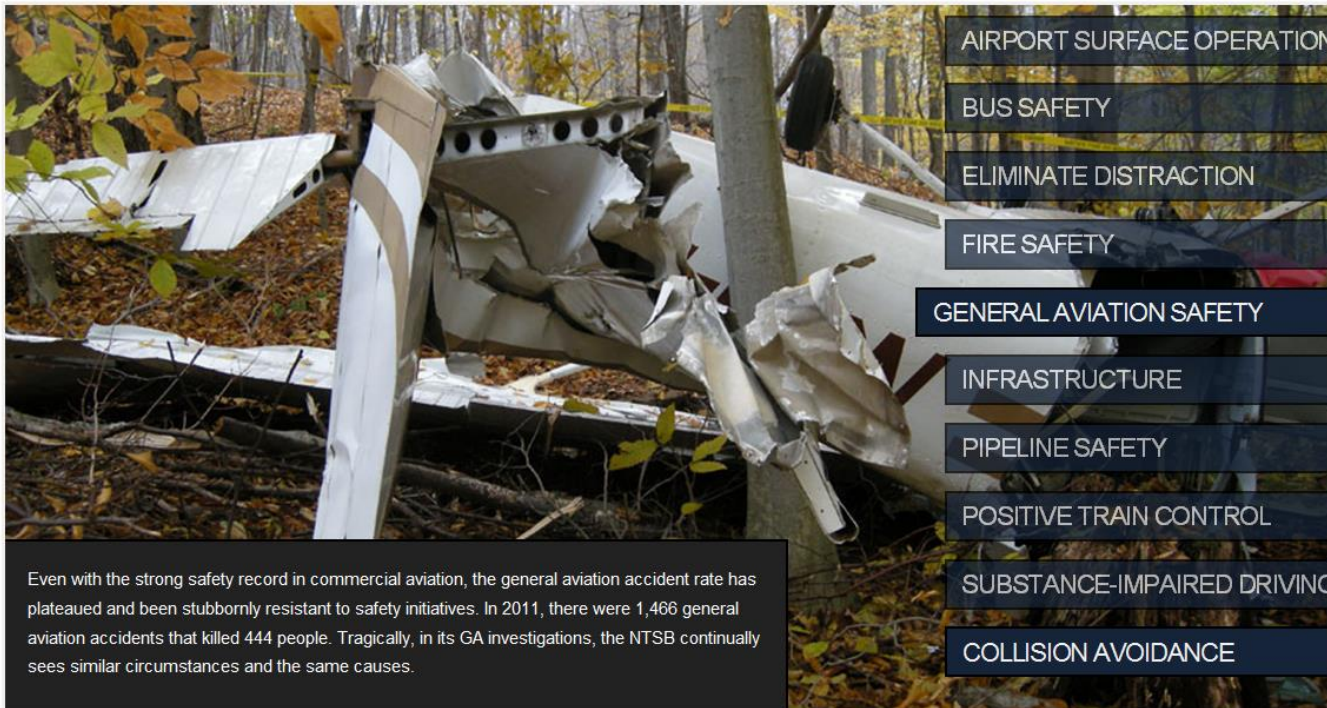


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# Most Wanted List

## MOST WANTED LIST

The Most Wanted List represents the NTSB's advocacy priorities. It is designed to increase awareness of, and support for, the most critical changes needed to reduce transportation accidents and save lives.



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# What is General Aviation?



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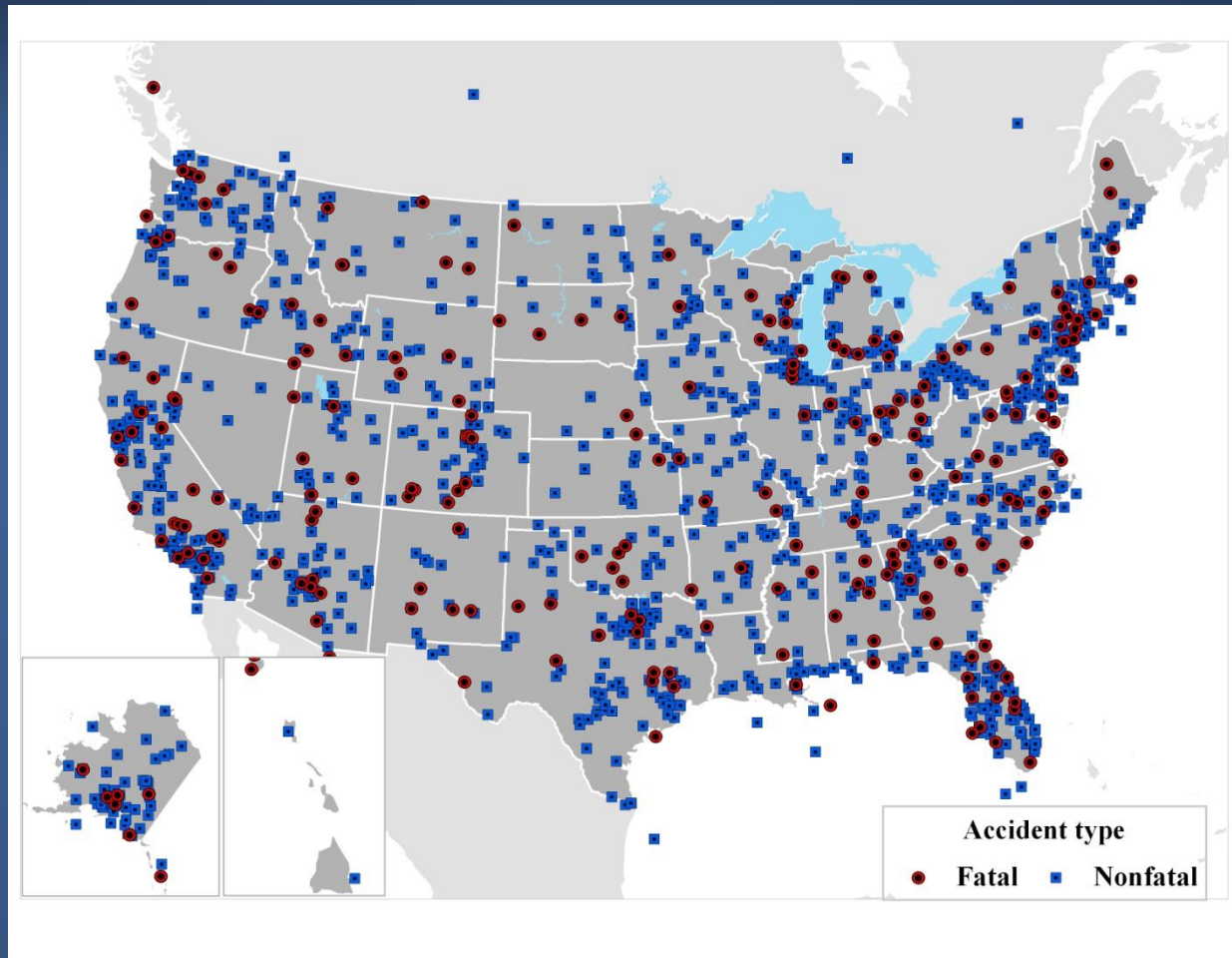


# Pilots, Aircraft, and Flight Activity (Estimates)

- 55,000 new student pilot certificates issued (2011)
- 97,000 active flight instructors
- 617,000 active pilots
- 215,000 aircraft active in GA
  - 155,000 of those are fixed-wing, piston-powered
- 21.7 million hours flown in 2010
  - 10.4 million hours were personal/business flights

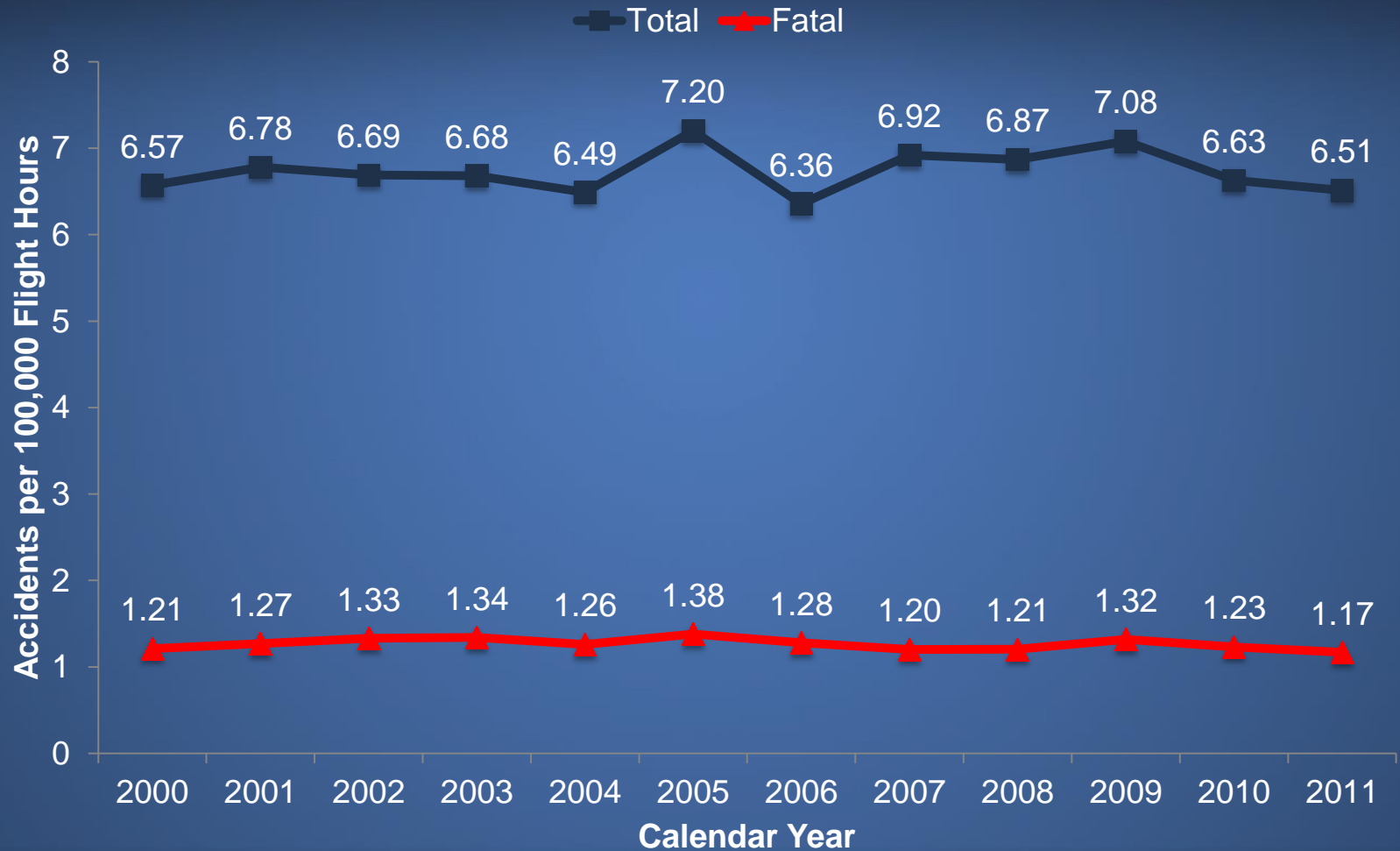


# Geographic Distribution of Accidents



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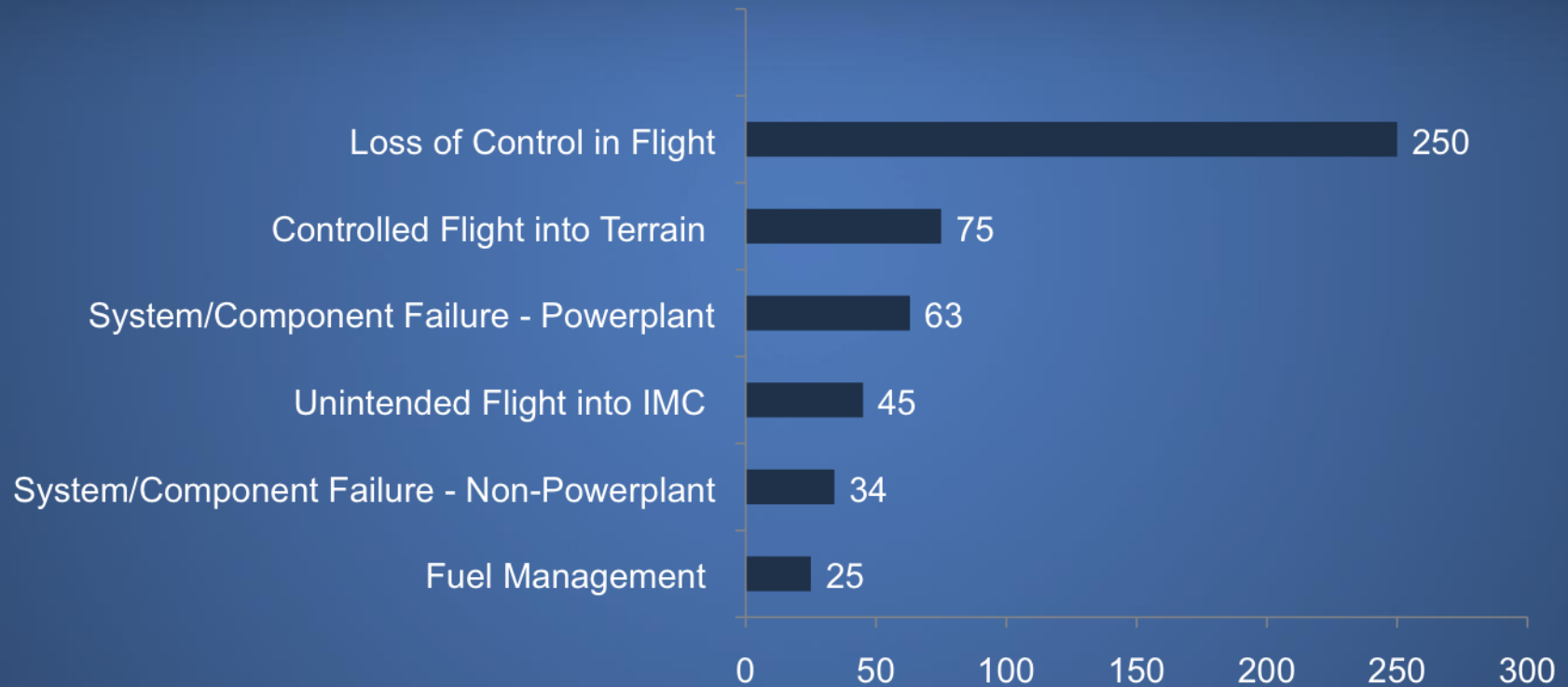
# GA Accident Rates



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# Personal Flying Defining Events

## Number of Fatal Accidents





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### ★ In-Cockpit NEXRAD Mosaic Imagery ★

*Actual Age of NEXRAD Data Can Differ Significantly  
From Age Indicated on Display*

#### The Problem

- Weather radar "mosaic" imagery created from Next Generation Radar (NEXRAD) data is available to pilots in the cockpit via the flight information service-broadcast (FIS-B) and private satellite weather service providers.
- A mosaic image presents radar data from multiple radar ground sites on a single image on the cockpit display. When a mosaic image is updated, it may not contain new information from each ground site.
- The age indicator associated with the age of the actual data. Instead, the age indicator shows the age of the service provider. Weather service providers can be older than the age indicated on the display.
- Due to latencies inherent in the ground site to the cockpit display, the mosaic-creation process can significantly delay the time it takes for the data to be displayed.
- Although such situations are rare, the age of the data can EXCEED the age indicated on the display.

<sup>1</sup> Actual maximum age differences can



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### ★ Meteorological Evaluation Towers

*Pilots urged to be vigilant for  
Meteorological Evaluation Towers*

#### The Problem

- Meteorological Evaluation Towers (METs) are used to measure wind speed and direction during the development of wind energy conversion facilities. METs are made from galvanized tubing (or other galvanized structure) with a diameter of 6 to 8 inches and are secured with guy wires that connect at multiple heights on the MET and anchor on the ground.
- Many METs fall just below the 200-foot Federal Aviation Administration (FAA) threshold for obstruction markings. They can also be erected quickly and without notice to the local aviation community, depending upon their location.
- Because of their size and color, pilots have reported difficulty seeing METs from the air. Therefore, METs could interfere with low-flying aircraft operations, including those involving helicopter emergency medical services, law enforcement, animal damage control, fish and wildlife, agriculture, and aerial fire suppression.
- The NTSB has investigated several fatal accidents involving aircraft collisions with METs:
  - On January 10, 2011, a Rockwell International S-2R, N4077X, collided with a MET during an aerial application in Oakley, California.
  - On May 19, 2005, an Air Tractor AT-602, N90172, collided with a MET that was erected 15 days before the accident in Ralls, Texas.
  - On December 15, 2003, an Erickson SH-A Global, N434BW, collided with a MET near Vanaville, Oregon.
- While Wyoming and South Dakota have implemented requirements for METs to improve the safety of low-flying aircraft, not all states have such requirements for METs. (Wyoming maintains an online database of METs and requires all METs to be registered and marked so that they are visible from a distance of 2,000 feet. South Dakota requires that METs be marked.)

# General Aviation (GA) Safety Alerts

March 12, 2013



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# GA Safety Alerts

- Define a GA safety problem
- Provide statistics on the problem
- Provide examples of accidents
- Provide ways to prevent accidents



# GA Safety Alert Topics (examples)

- Aerodynamic stalls at low altitude
- Reduced-visual references
- Aircraft mechanical problems
- Pilots' risk management
- Mechanics' risk management



[www.nts.gov](http://www.nts.gov)



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# Uncontrolled In-Flight Collision with Terrain

## AIA Flight 808, Douglas DC-8-61, N814CK

### U.S. NAS, Guantanamo Bay, Cuba, August 18, 1993

First NTSB aviation accident investigation  
to cite fatigue as probable cause

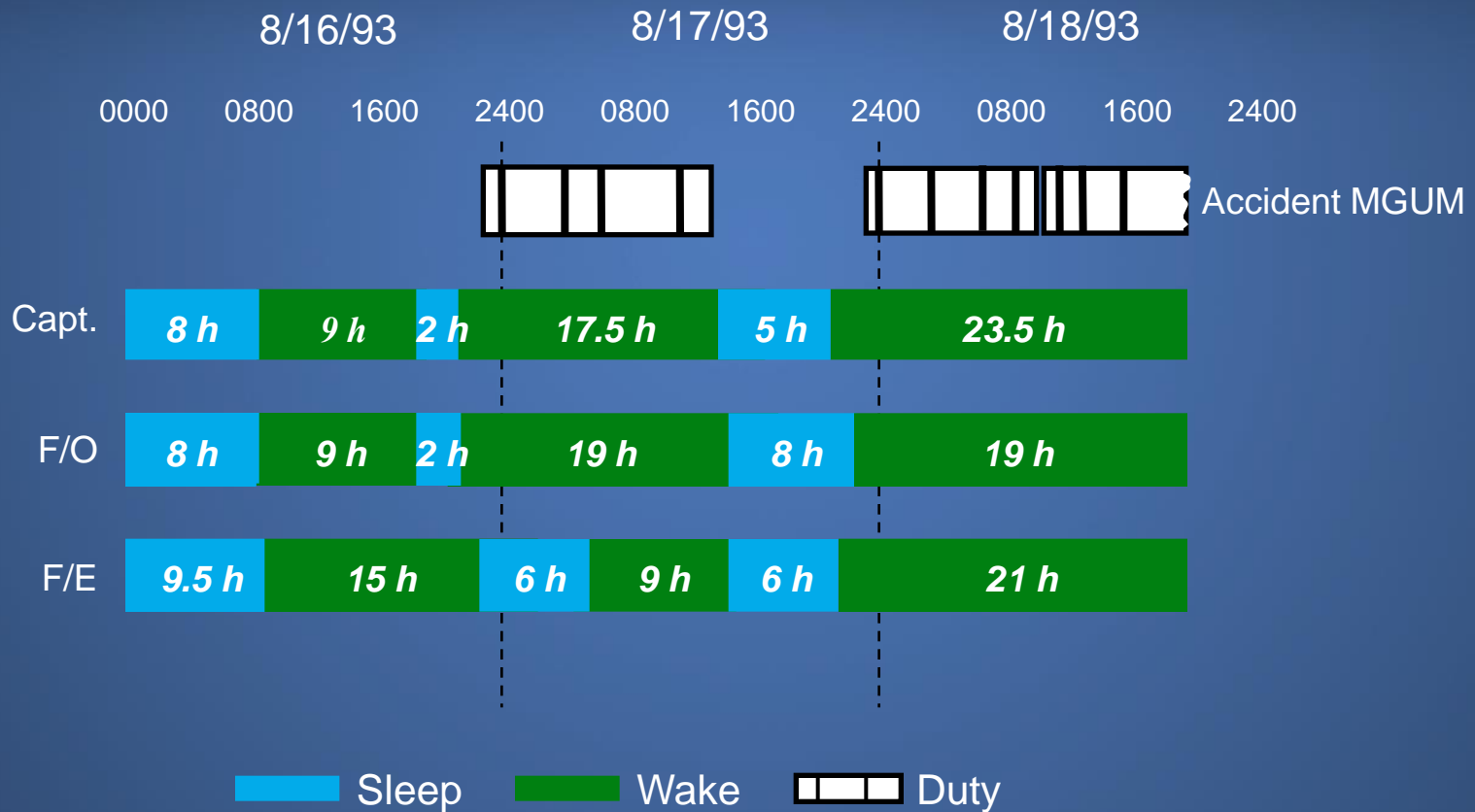


- acute sleep loss, sleep debt, circadian disruption



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# Crew Sleep History





# Observed Performance Effects

- Degraded decision-making
- Visual/cognitive fixation
- Poor communication/coordination
- Slowed reaction time





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Uncontrolled In-Flight Collision with Terrain  
AIA Flight 808, Douglas DC-8-61, N814CK  
U.S. NAS, Guantanamo Bay, Cuba, August 18, 1993

“The National Transportation Safety Board determines that the probable causes of this accident were the impaired judgment, decision making, and flying abilities of the captain and flight crew due to the effects of fatigue...”



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# Owatonna, MN (July 31, 2008)



8 fatalities



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# Owatonna Crew Fatigue Factors

- acute sleep loss (Capt/FO)
- cumulative sleep debt (FO)
- early start time (Capt/FO)
- excessive sleep need (Capt)
- insomnia (FO)
- self-medicate/prescription sleep med (FO)



# Probable Cause/Contributing Factors

“Contributing to the accident were . . .  
(2) fatigue, which likely impaired both  
pilots’ performance; . . .”



# Challenges of a 24/7 Society



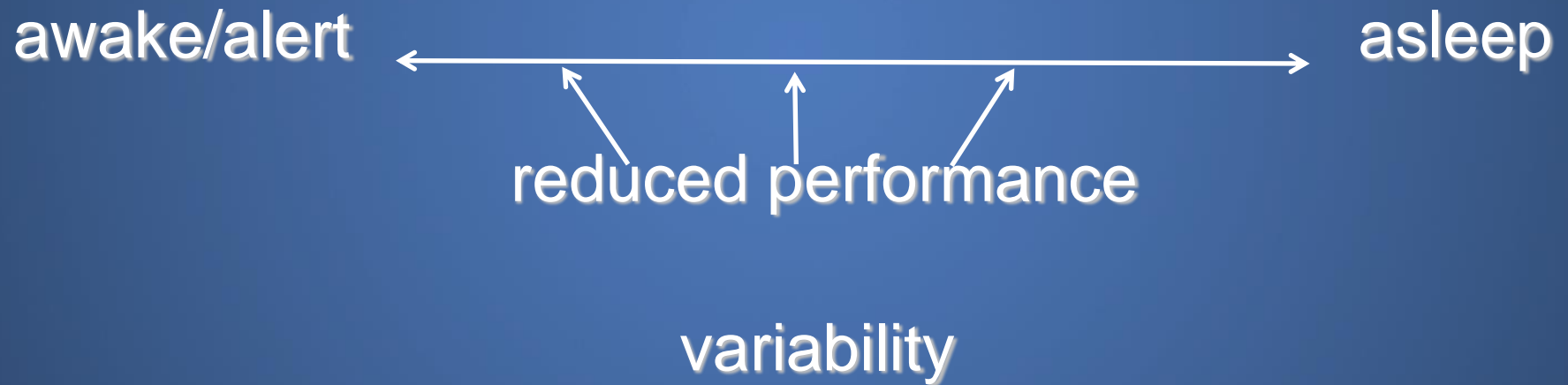
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# Fatigue Risks

Fatigue can degrade  
every aspect of  
human capability.



# Fatigue Risks





# Fatigue Risks

- degraded 20 – 50%+:

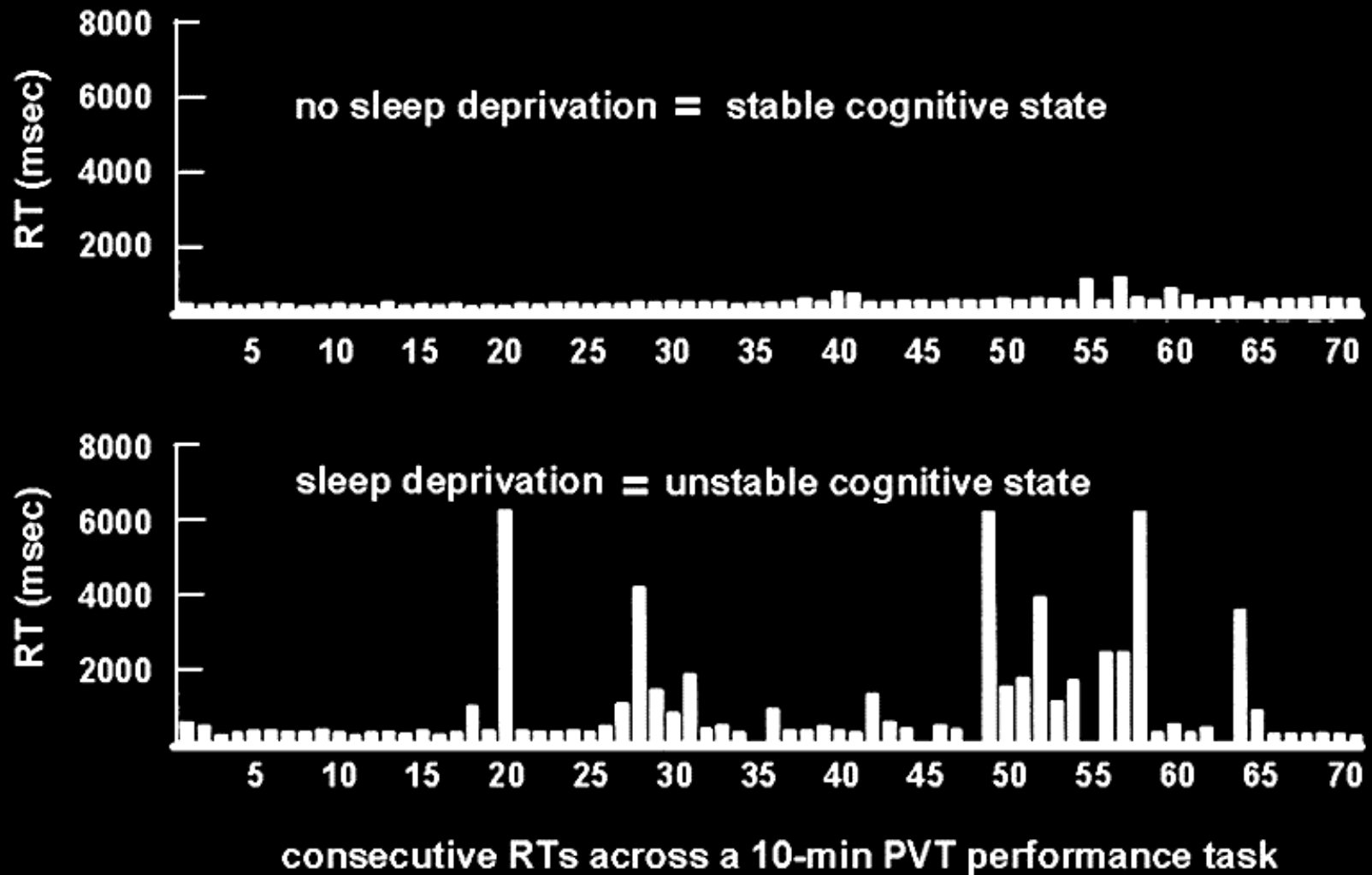
- reaction time
- memory
- communication
- situational awareness
- judgment
- attention
- mood

- increased:

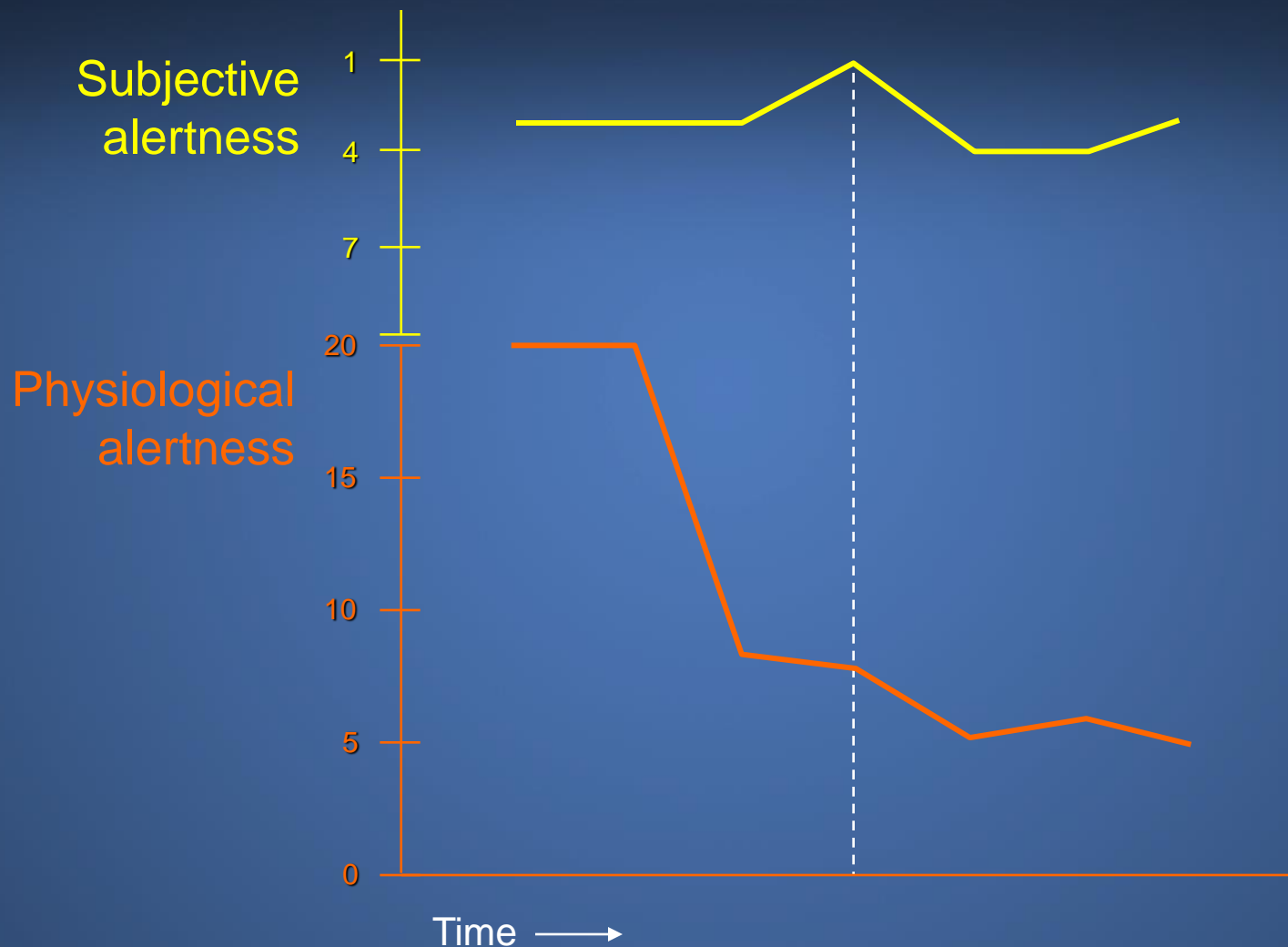
- irritability
- apathy
- attentional lapses
- microsleeps



# Fatigue and Reaction Times



# Alertness Reports Often Inaccurate



Adapted from Sasaki et al., 1986



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# Four Fatigue Factors +

- Sleep loss
- Continuous hours of wakefulness
- Circadian/time of day
- Sleep disorders
- Other considerations



Good sleep, safe travels.



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